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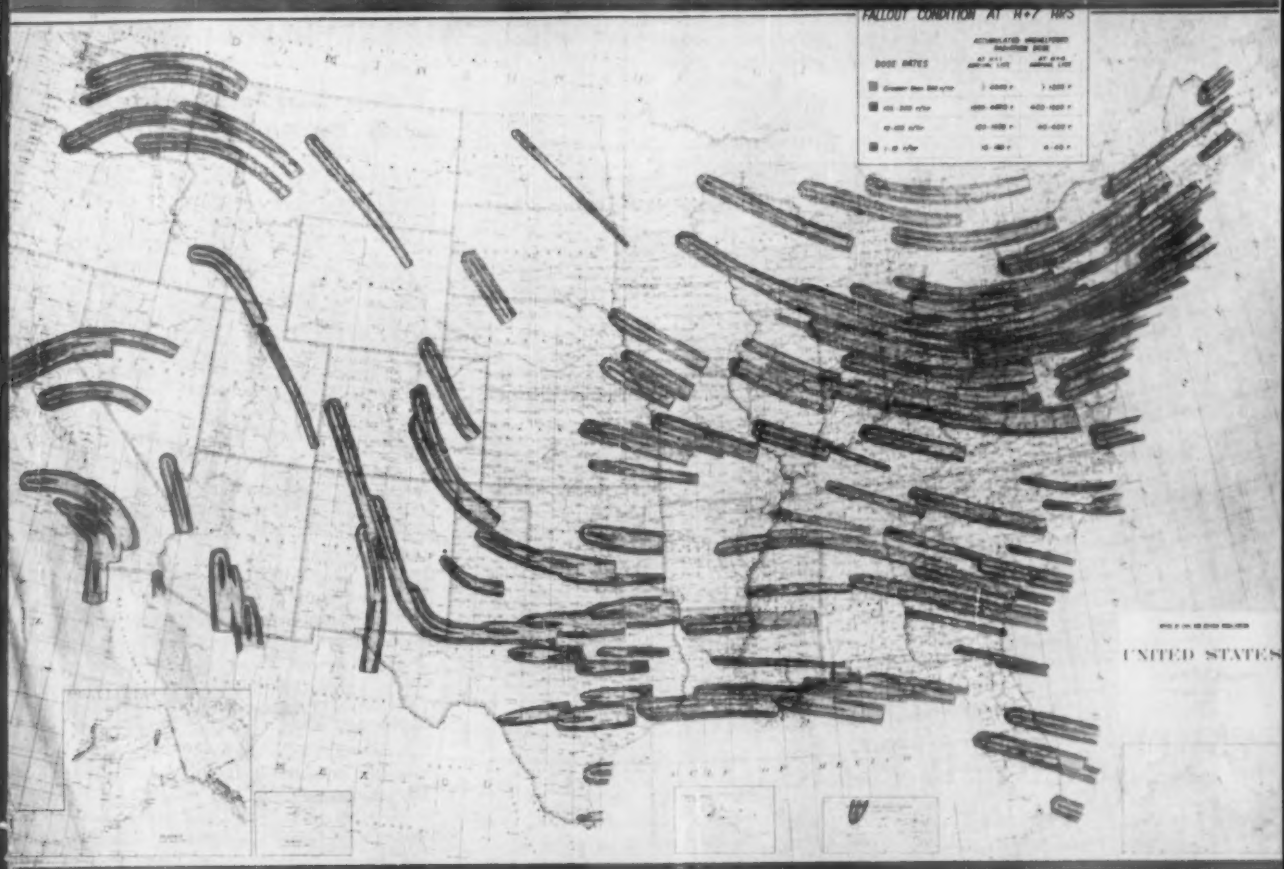
SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE



Fallout Patterns

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A SCIENCE SERVICE PUBLICATION

ASTRONOMY

Venus to Eclipse Star

ASTRONOMERS are setting forth on an unusual eclipse expedition to observe the eclipse of a star by a planet, Venus, on Tuesday, July 7, in hope of discovering more about the atmosphere of the earth's sister planet.

Because bright Regulus is a hot star with an undistinguished spectrum, its light, seen as it disappears and reappears behind Venus, will pass through the planet's gaseous envelope and be modified so as to give clues to what the atmosphere contains and how much.

The eclipse occurs at 9:15 a.m. Eastern Standard Time, when Venus is low in the east in broad daylight. Farther west, of course, it will not have risen. Therefore, Harvard College Observatory is sending three parties to observe from Europe, two from Italy and one from southern France.

European observatories are expected to use their instruments for stay-at-home expeditions.

The eclipse can be viewed from a great area of the earth's surface, but haze and clouds are likely to interfere with observations from the eastern U.S. So expeditions are going to other continents where Venus will be higher in the sky and clear weather more probable.

The famous observatory at Pic du Midi in the Pyrenees that specializes in solar observations and has suitable telescopes and spectroscopes is expected to observe.

Venus is the bright evening "star," the brightest in the heavens. It is not a star like Regulus, but is one of the nine planets in the solar system, number two outward from the sun. It shines by reflected sunlight. Telescopes or even binoculars show it as a disc with phases comparable to the earth's moon. At the time of the eclipse, on July 7, it will be a half-moon in shape.

The star Regulus will disappear behind Venus as seen from the earth and remain hidden for about 12 minutes. The five seconds before and after the total eclipse will be the critical time for the taking of spectrum photographs that will tell what is in Venus' atmosphere, its temperature and density.

The Venus atmosphere as previously determined is believed to be principally carbon dioxide.

Regulus is a first magnitude star so distant from the solar system that its light, traveling 186,000 miles a second, requires 67 years to reach earth.

An eclipse by Venus of a star that can give useful astronomical information is a relatively rare event.

The passing of Venus in front of the star Regulus, called an occultation by astronomers, is like an eclipse of the sun by the moon. In the three centuries that man has been looking at the heavens through telescopes, no one has ever seen an occultation of a first-magnitude star, like Regulus, by Venus.

As the eclipse progresses, the light from Regulus will be gradually weakened by the atmosphere of Venus. Sensitive photoelectric equipment will be used to record the changing amounts of light reaching earth from Regulus.

East Coast residents in the U.S. will need a telescope of three- or four-inch aperture to view the occultation.

Venus is almost a twin of the earth in size and mass. With the exception of the sun and moon, it is the brightest object in the sky, its brilliance being largely due to dense clouds that cover the planet's surface. Although the clouds reflect the sunlight well, they prevent astronomers from observing the solid surface and thereby establishing its rotation period. It takes 225 days to travel once around the sun.

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ASTRONAUTICS

Spacemen Picked by Cards

IT WAS in the cards when the seven astronauts were selected.

All the information that scientists and Government officials needed to know about the space-flight candidates is neatly and compactly "written" on a deck of about 80 IBM record cards.

Results of all the special stress, psychological and physical tests that the astronaut hopefuls received were coded so that final selection of the candidates, made by the National Aeronautics and Space Administration, was simplified.

It was early 1958 that the Lovelace Foundation for Medical Education and Research in Albuquerque, N. M., began developing a method for recording detailed medical information for the U. S. man-in-space program. The cards were ready when the 32 astronaut candidates came for their tests, Dr. A. H. Schwichtenberg, head of Lovelace's department of aviation and space medicine, told scientists meeting in Poughkeepsie, N. Y.

When the men in space return from their journeys, these cards will be available for important additions, he told SCIENCE SERVICE.

Calling upon their experience in aviation medicine, the researchers determined the kinds of medical history, tests and examinations needed to select the first candidates for space travel.

In addition to the routine information, the cards answered questions on smoking and drinking history, and included anthropological data and centrifuge acceleration test results. Moving pictures of the heart, designed to show up coronary artery calcification, were also coded.

When the cards had all been checked, needed laboratory tests done, and a written summary prepared, each astronaut case was considered by a board of physicians who had had experience in aviation medicine.

This technique of recording medical histories on cards has general application, Dr. Schwichtenberg said.

The method which he described at a medical symposium sponsored by the International Business Machines Corporation should be compatible with future general clinical and hospital use in the Air Force as well as in civilian medicine, Dr. Schwichtenberg said. Now it is being used for various man-in-space programs and in other special projects.

Science News Letter, July 4, 1959

MEDICINE

Virus, Not Iodine Lack, May Cause Goiter

GOITER MAY be caused by a virus instead of a lack of iodine.

The incidence of goiter throughout the world rises and falls in some specific areas and acts like a virus-caused disease, Dr. Isidor Greenwald of New York University College of Medicine told the American Medical Association meeting in Atlantic City, N. J.

In Switzerland, for instance, the number of goiter cases has dropped the past 200 years, he said. However, there are a great many cases of cretinism in Switzerland. This disease is characterized by stunted growth and mental retardation. Cretinism is known to be caused by goiter, Dr. Greenwald said. Many Swiss babies have goiter when born, he pointed out.

In the United States, there are fewer goiter cases than in Switzerland. Yet Americans do have a relatively high rate of hyperthyroidism, overactive thyroid glands. This disease is also linked with goiter.

The Japanese supposedly eat many sea foods and thereby receive enough iodine in their diets, yet they have a high rate of goiter and hyperthyroidism. Contrary to the Swiss, who also have a high goiter rate, the Japanese do not have the problem of cretinism.

Because goiter can produce different diseases in two countries—cretinism in Switzerland and hyperthyroidism in Japan—it is possible that goiter is caused by a virus, he asserted.

Dr. Greenwald recalled a serious outbreak of goiter in livestock in the states of Washington and Montana in 1915. The animals were fed iodized salt and their goiters disappeared. Dr. Greenwald said the outbreak resembled a virus-caused communicable disease.

A lack of iodine should not produce such different effects in different countries, or in the same country at different times, as has been observed in Italy, he said. But a virus infection might act this way, he concluded.

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MEDICINE

U.S.S.R. Tests Virus Candy

Research with the live polio virus vaccine has reached the point where human volunteers, both in Russia and in the U.S., are testing it.

MORE THAN 4,000,000 Russians have gulped down, in one form or another, a live virus that is capable of preventing paralytic polio. (See SNL, June 27, p. 405.)

The live virus vaccine used in Russia is an offspring of the live polio virus developed by Dr. Albert Sabin of the University of Cincinnati. Results so far look good: persons who have received the vaccine have built up protective levels of antibodies against the crippling form of polio.

However, Russia faces her polio season now and through the summer, so that it will be autumn before Russian scientists know definitely how much protection this vaccine offers, Dr. M. K. Voroshilova, Institute for the Study of Poliomyelitis, Academy of Medical Sciences, Moscow, told SCIENCE SERVICE.

Many of these Russians have already received the Salk vaccine which contains killed virus. Others have received either the one vaccine or the other. The country is so large that various sections receive different types of vaccine, the woman scientist said. She and fellow colleagues attended a five-day conference on live polio virus vaccine in Washington in cooperation with the World Health Organization.

Dr. Herald Cox, identified with the Lederle Laboratories strain of live virus vaccine, reassured reporters that well controlled experiments with the live virus could be a useful measure even among persons who have received the Salk vaccine.

When a person receives the Salk vaccine, his body builds up a certain level of immunity to polio. Then, when he receives a dose of the live virus, the level of antibodies shoots even higher. To date, few such tests have been carried out in the United States because some scientists felt that the immunizing effect of the live virus would not be evident due to the mass inoculation of Salk vaccine.

One question would remain unanswered in the event of a polio epidemic in an area where persons had rceived both vaccines. It would be impossible to determine which vaccine prevented the polio from crippling the vaccinated.

Test Live Vaccine

THE LIVE POLIO VIRUS vaccine has proved to be effective among 550 Americans who volunteered to be treated.

The group of 550 volunteers consisted of University of Minnesota married students and their children.

The vaccine, which was given by mouth, provided more protection for the children than for the adults, seven researchers report in the *Journal of the American Medical Association* (June 20).

Although a substantial portion of the population tested had previously received Salk shots, the levels of antibodies in these persons shot up when they swallowed the live virus vaccine. This is important since it indicates that the presence of a Salk-vaccinated population should not prohibit further studies of this nature in the United States, the authors point out.

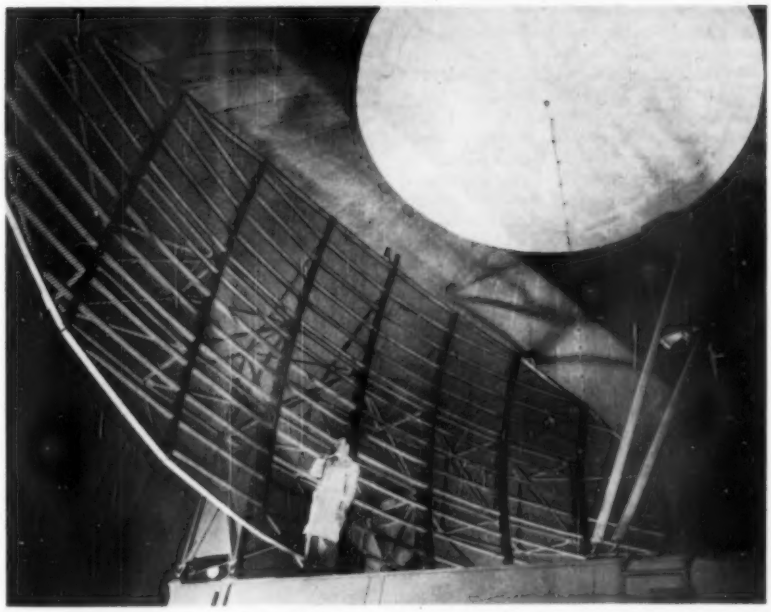
The fact that Salk shots have been widely administered among the U.S. population has been one argument against using the live virus vaccine in tests in this country.

One of the big problems facing these investigators is the question of why the adults did not build up antibody levels similar to the children's. They speculate that dosage may have to be altered for adults. It could be the acidity in the stomach that causes a lessened response in adults.

Current studies are seeking answers to this question. Researchers are also attempting to discover whether viruses for all three types of poliomyelitis can be combined into one dose without losing the effectiveness of single doses of each.

The authors of the article are Drs. Robert N. Barr, Henry Bauer, Herman Kleinman, Anne C. Kimball, and Miss Marion K. Cooney, all of the Minnesota Department of Health, Dr. Mauricio Martins da Silva, now at the Pan American Sanitary Bureau, and Dr. Eugene A. Johnson of the University of Minnesota.

Science News Letter, July 4, 1959



HIGH POWER RADAR—A "super power" radar that detects air target at far greater ranges and at higher altitudes than present-day air defense radars has been developed by the General Electric Company jointly with the Air Research and Development Command. The upper photograph shows technicians installing a multi-million watt Klystron tube that permits generation of extremely high powers in the microwave region. The feed horn, antenna and 50-foot rubberized radome are shown below.

PSYCHIATRY

Patients Predict Behavior

BORROWING from the Armed Forces' "buddy-rating" techniques, a group of psychologists found that mental patients were as accurate as the psychiatric staff in predicting how their fellow patients would get along after leaving the hospital

The three-year study, reported in the *Journal of Consulting Psychology* (June), was made at the Ann Arbor (Mich.) Veterans Administration Hospital.

Senior author of the report Dr. Julian J. Lasky told SCIENCE SERVICE the idea for the study came to him at Officer Candidate School in 1944. There he first saw the system in which men accurately rated leadership potential of their buddies.

The patients and the hospital staff were asked to predict whether within two years after discharge each patient would: 1. be hospitalized again; 2. work steadily; 3. have serious family trouble; and 4. enjoy good physical and mental health.

Both groups scored 70% accuracy. Reflecting the results of other studies, no patient was able to predict his own future adjustment. An unexpected result, however, was that staff people made their poorest predictions in their own areas of specialization.

For example, social workers missed in predicting family adjustment. Job adjustments did not turn out as occupational therapists expected. Psychiatrists were off in rating job, family and health adjustment of their own patients. Aides and nurses failed in forecasting health adjustment. Dr. Lasky wondered if these predictions were inaccurate because people lose some of their objectivity when they are too involved in their specialties.

Dr. Lasky, now at the VA Central Neuropsychiatric Research Unit, Perry Point, Md., said mental patients, in certain ways, give each other treatment. A patient tells his friends things he will not reveal to the staff who often hear only what the patient thinks they want to hear.

"The patient may look dischargeable to the staff," he said, "but the other patients know otherwise."

Dr. Lasky believes these presently untapped pools of interpatient understanding and knowledge could lead to greatly improved treatment in the mental hospitals.

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BIOLOGY

Study Light Sensitivity

RADIATION can mean the difference between night and day to a king crab.

When a king crab is in the dark and is receiving an accumulated dose of radiation, his sensitivity toward a flash of light diminishes. However, if it can manage to amble out of the dark into a light area, its original sensitivity to light is restored when it again enters the dark, Dr. James O. Smith of the department of psychology, Florida State University, told SCIENCE SERVICE.

The king crab's sensitivity to a one-second flash of light in the dark dipped sharply when the radiation dose was anywhere below 25 roentgens.

It is possible, Dr. Smith speculated, that a human's visual sensitivity to light can be altered in a similar manner by a dose of radiation equal to that of a dental X-ray.

As the cumulative amount of radiation is increased by increments of 25 to a total of 200 roentgens, the crab's ability to respond to the flash of light continues to diminish at a lesser rate, Dr. Smith and William W. Dawson report in *Science* (June 19).

The diminished sensitivity persists long after the radiation has ceased as long as the crab is kept in the dark, the investigators report.

Since the natural sensitivity to light is restored when the crab is again adapted to a light area, it appears that the damage that occurs to the eyes by radiation doses of 200 roentgens or under is temporary.

Scientists have previously shown that doses between 1,700 and 10,000 roentgens will cause severe damage to cells of the eyes of some animals.

The king crab was chosen for this experiment because of its large lateral eyes.

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BIOLOGY

Russians Work on Germ-Radiological Warfare

IN THE EVENT of a war the Russians will probably use a deadly one-two-three punch of chemicals, microorganisms and radioactive substances.

Any combination of these three agents is deadlier than one alone, the Russians have found. This is stated in a report by Russian scientists on the best means for destroying the enemy and any possible means of protection he may devise.

The report was made in *The Organization of Medical Service Following Mass Contamination of the Population* translated and distributed by the Central Intelligence Agency.

In their study the Russian scientists made the following points:

1. Radiation sickness that follows the introduction of radioactive substances into the body, destroys the body's antibody production. This means that any protective program of immunization, such as might be set up by a nation's public health service, against biological warfare would be meaningless.

2. Ordinary microorganisms normally found in the body can be turned into deadly killers, using the combined forms of warfare discussed in the article.

3. The body's normal barriers to "germs" can be torn down, destroyed by chemicals alone or in combination with radioactive substances.

4. Disease-causing microorganisms can be made to penetrate the body's defenses much faster. They can be combined with chemicals, radioactive substances or other microorganisms so that scientists will not be able to diagnose and treat the resulting disease.

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PUBLIC HEALTH

Study Fallout Patterns

Study of fallout and atmospheric patterns indicate that the radioactive fallout from a nuclear war would probably be strongest in the Northern Hemisphere.

See Front Cover

SHOULD a nuclear war occur between the United States and the Soviet Union, all of the radioactive fallout would rain down north of the equator within three to five years, a Congressional committee was told.

Assuming all the bombs were exploded over the U.S. and Russia, the Southern Hemisphere would escape the fallout hazards posed by strontium-90 and cesium-137.

The same would not be true for radioactive carbon-14, Dr. Lester Machta of the U.S. Weather Bureau told a special radiation subcommittee of the Joint Committee on Atomic Energy.

Some years after the attack, he said, carbon-14 would spread to the Southern Hemisphere.

The possible biological effects of the nuclear's war aftermath was considered at a week-long hearing, June 22-26.

Most of the hearing concerned the results of a hypothetical attack and retaliation taking place last Oct. 17. In this one-day mock war, the U.S. and Russia traded nuclear blows totaling about 4,000 megatons. Nuclear weapons are rated in megatons, one megaton being the equivalent of the blasting power of a million tons of T.N.T.

Dr. Machta said no matter where in the Northern Hemisphere the bombs were dropped, the fallout pattern would be much the same. It would concentrate at 45 degrees north latitude (including roughly Bangor, Me., Buffalo, N.Y., Detroit, Mich., Minneapolis, Minn., and Portland, Ore.) and taper off toward the equator and north pole.

Of all the radiation produced by the attack he said, 80% would be deposited quickly as local fallout, 15% would rise to the stratosphere (above seven miles) and 5% to the troposphere (below seven miles).

Most of the radioactive materials would be brought down by rain and snow. Most of the tropospheric material would fall out within a month and the stratospheric radioactivity would come down most likely within three to five years, Dr. Machta added.

In the photograph on the cover of this week's SCIENCE NEWS LETTER, the radioactive fallout pattern over the United States at seven hours is shown after the nuclear bomb explosion. The lighter areas of the "arrows" represents a dose rate greater than 300 roentgens per hour, while the darkest areas represent rates of between one and ten roentgens per hour.

IT WILL BE "hotter" in the shade of the old apple tree than out in an open space when the fallout from an atomic blast drifts down, a civil defense investigator testified in Washington.

It would be very unwise to duck under a tree for shelter from fallout, Myron B. Hawkins of the Civil Defense Research Project at the University of California, Richmond, Calif., told SCIENCE SERVICE. Mr. Hawkins testified at a Congressional hearing on atomic energy.

The average person would be better off staying in a basement or digging a foxhole, he added. Trees act as collectors of large fallout particles. As the particles meet and join together on the leaves they become heavy and drop to the ground beneath the trees.

For instance, on the West Coast you often see rain dropping only from tree leaves. This is because the fog particles float just above the surface of the earth. When the particles get caught on the leaves of trees they join together, become heavy and roll off, leaving the impression that it is raining under the trees.

Meanwhile, the remaining fog particles, because they have nothing upon which to condense, continue to float and are often carried away by winds. The same thing can happen with fallout particles, Mr. Hawkins said.

Nature would be a prime mover of fallout across the country. Wind, rain and water flow are the basic natural shufflers.

Rain could wash fallout from buildings and pavements into streams that empty into storm sewers, he reported. However, those particles that are deposited in flat areas such as farms would probably not seep into the depths of the earth because they would tend to become caught in the roots of the plants growing on the soil.

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BUBBLE CHAMBER—The giant 72-inch "bubble chamber" in the University of California's Ernest O. Lawrence Radiation Laboratory, which is filled with liquid hydrogen, is used in studies of high energy nuclear particles generated by the Bevatron. The whole instrument weighs some 200 tons, and can "walk" by means of hydraulic "feet." The work with the instrument is a part of the fundamental research program of the laboratory sponsored by the Atomic Energy Commission.

GENERAL SCIENCE

NSF Reports on Scientists, Engineers in Industry

CLOSE TO three-quarters of a million scientists and engineers are working in industry, the National Science Foundation has reported.

However, only one-third of these 738,000 persons were engaged in research and development activities as of January, 1957.

From 1954 to 1957, employment of scientists and engineers increased by about 30% with employment in life sciences and physics increasing the most, by about 60%. At the same time, there was an increase of 80% in research and development costs.

Engineers made up the largest occupational group: 528,000. Among the scientists, the chemists were most numerous, 72,000. Other scientists are ranked as follows: life scientists, 16,600; earth scientists, 14,200; mathematicians, 12,400; physicists, 12,100, and metallurgists, 10,800.

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PHYSICS

Large "Bubble Chamber" Operates Successfully

THE WORLD'S largest known "bubble chamber" for detecting nuclear particles is now in successful operation at the University of California's Ernest O. Lawrence Radiation Laboratory at Berkeley.

The detector is six feet long, holds 150 gallons of liquid hydrogen. It looks like a bathtub and is about the same size. The California bubble chamber is part of a system that ties together the atom-smashing Bevatron, automatic scanning devices that borrow the principles of astronomical measuring engines, and high speed computers.

The system permits a deeper penetration of the mysteries of the atomic nucleus than previously possible, because the information to be studied is available in great quantity and covering a longer period of time.

In the bubble chamber, nuclear particles leave tracks of tiny bubbles that can be photographed for study and measurement.

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ZOOLOGY

Eye Lens Tells Age

"LOOK into my eyes and I will tell you how old you are."

Rexford D. Lord Jr., biologist with the Illinois Department of Conservation, Urbana, has not reached this point. But he can tell a mammal's age by analyzing its eye lens.

The lens of a mammal's eye grows throughout the animal's life, he told scientists at the American Society of Mammalogists meeting in Washington. For example, embryo-type cells are found on the edge of the lens in aged persons. Apparently the lens begins drying from its center outward beginning at birth. New "wet" cells are being laid down on the outside of the lens.

Using this information, Mr. Lord said he was able to plot four growth curves for any lens of any species of mammal. He has already computed the growth curve for the cottontail rabbit. Work has also been done with the Alaskan fur seal and deer.

Once the growth curves for an animal are known, Mr. Lord said, an animal's age can be determined readily by comparing its lens with the standard for the species. The technique for obtaining the growth curves is based on removing the lens from the eye (which has been preserved in 10% formalin) and drying it in an oven and weighing it. Plotting the growth curve required a computer, Mr. Lord said.

Details of the technique will appear in an early issue of the *Journal of Wildlife Management*, the researcher said.

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BIOLOGY

Walrus Being Overhunted

STATISTICS are against the Pacific walrus. If steps are not taken to protect this animal immediately, it will be extinct in less than ten years.

The conservationists know this. But chances are slim for passage of the needed laws, national and international, to protect the walrus from his one enemy, man.

Each year some 10,000 walrus are hunted and slaughtered. And each year only 5,000 are born. With a total population of 45,000 there is little hope that the walrus can maintain itself against the hunter.

Not only is there over-hunting of the walrus, there is also a huge loss in dead animals never recovered. At the most, Dr. John L. Buckley of the U. S. Fish and Wildlife Service told SCIENCE SERVICE, less than half of the walruses killed or wounded are recovered.

Several factors contribute to the disappearance of the walrus, Dr. Buckley said. Perhaps most important is lack of control over hunters in international waters. He pointed out that since some of the walrus population is in the territorial waters of the Soviet Union, international cooperation is needed to regulate the harvest. Some first steps are being taken, Dr. Buckley said, to get agreement between U. S. and U. S. S. R. researchers in the field. An attempt is also being made to write a bill regulating walrus hunting by American citizens outside the U. S.'s three-mile territorial limit.

Alaskan natives have the exclusive privilege of taking walrus—ostensibly for food. While the animal is undoubtedly indispensable to the natives, recent developments have led to excess hunting and waste. The use of guns has resulted in some "trigger-happy" hunts, for example. The demand for carved ivory, brought about largely by the stationing of large numbers of men at military bases, is the greatest incentive to hunt walrus, Dr. Buckley said.

It is important to know just how many walrus are needed for food, ivory and hides, what proportion of food is spoiled or wasted and how much ivory is sold carved and how much "raw."

If we do not learn how to manage the Pacific walrus, Dr. Buckley said, we may find in the not very distant future that we can add it to the growing list of extinct animals.

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OCEANOGRAPHY

Ocean Bottom Changes

THE DEEP OCEAN FLOOR is not a peaceful, serene place of eternal silence but an actively changing one with the underwater equivalent of snow avalanches in the Alps.

The mystery of what happens in the vast dark regions lying beneath deep oceans is yielding to understanding, Dr. Bruce C. Heezen of Columbia University's Lamont Geological Observatory, New York, reports.

"The picture of an unremitting snowfall of sediment which softly casts a thin veil over the rugged, grand and imposing" features of the deep sea floor is not an accurate one, he said. To this picture must be added turbidity flows that, like snow avalanches in the Alps, sweep down and smother the features of the lower slopes.

Dr. Heezen said recent surveys have shown that ocean currents clean the sediment from the higher and bolder submarine mountains in much the same way winds striking mountains drive snow from the peaks.

Moreover, he reports, just as wind and water shape the land, so do submarine currents of water and mud shape the ocean floor. They do this by erosion, by solution and by friction.

Dr. Heezen says one of the "most perplexing" problems concerning ocean floors is the thinness of the deep-sea sediments as determined by measurements of earthquake waves.

Over most of the Pacific, the sediment deposits are less than three-tenths of a mile thick; they are about the same in the Atlantic.

If the rates at which these sediment deposits were laid down are at all comparable to those measured for the last several thousand years by radioactive dating, Dr. Heezen reaches the "startling but dubious conclusion that the oceans were formed" over a hundred million years ago.

Answer to this and other problems may be provided by core samples obtained during the drilling in the deep-sea floor of the exploratory holes to the "Moho," where the earth's crust ends. Dr. Heezen's report on the deep ocean appears in the *Geophysical Journal*, published by the Royal Astronomical Society in London.

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GEOLOGY

Chilean Glaciers Indicate Weather Change

EVIDENCE has been found that the Southern Hemisphere has been warming up for more than a half-century.

An American expedition made this report after spending last January and part of February measuring the valley glaciers pushing out of the North Patagonian Ice Field into the waters at Laguna San Rafael, about 900 miles south of Santiago, Chile. The source of the ice is the snow on 13,314-foot Mt. San Valentin.

Cornell University geologist Ernest Muller told SCIENCE SERVICE that the four or five major glaciers have shrunk up to six kilometers (about 3.7 miles) during the past 80 years. Prof. Muller was one of six members of the American Geographical Society (New York) expedition headed by Dr. Calvin J. Heusser of the Society. The expedition was supported by the Office of Naval Research with Chilean cooperation.

Although this kind of warming-trend evidence has been found in the northern latitudes, it has hitherto been scanty in the Southern Hemisphere.

Actually, during the last year, the glaciers grew a few feet and pushed down some forest trees. This, Prof. Muller proposed, indicates a slight possibility that the warming has ended. He cautioned, however, that one year does not make a geological trend.

The Government of Chile hopes the glacial growth continues, because, along with terrier-sized deer and good fishing, glaciers are prime attractions in this Andean area.

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MATHEMATICS

Study Computer Memory

ELECTRONIC MACHINES one day may be able to tell why some children have difficulties in learning.

Tentative hope for this achievement was expressed at the International Conference on Information Processing in Paris.

Dr. David G. Willis of Lockheed's Missiles and Space Division reported that he has been running experiments in the field of creating "artificial intelligence" using electronic machines.

From experimental results, he predicted that a machine could be built which could duplicate the human brain in learning behavior. By working with such a machine, scientists could explore the workings of a child's mind with some degree of accuracy, perhaps solve learning problems, he said.

Dr. Willis, a mathematician, believes that the neuron—the "building block" of man's intelligence system—remembers what has happened to it in the past and that this permanently affects its behavior whenever subsequently stimulated. His theory differs with most theories in that he believes a stimulus will actually cause changes within the neuron.

By retaining a record of their activities throughout their whole life, the neurons function as memory elements, he said.

In one experiment, he simulated a system of 288 "neurons" on a digital computer. By feeding in a stimulus he was able to force out a pattern of response. His results showed that when a pattern is forced by some particular excitation, it tends to repeat every time that particular excitation is applied.

But as more and more patterns are forced by other excitations, he said, the response patterns begin to interfere. The interesting thing is the way these patterns interfere with each other.

He likened this laboratory-obtained reaction to the way in which memories may be associated in the human brain.

Science News Letter, July 4, 1959

ZOOLOGY

Big Game for U.S.

A BIG GAME hunter in the United States can skip the safari to Africa and take to New Mexico where he will find a challenging new animal—the Barbary sheep.

A zoo rarity from North Africa in the 1900's, the Barbary sheep has thrived wild in the U.S. and in capitivity. Now herds have been taken from the zoos and "planted" in the West. There are enough of these maned, big-horned sheep to provide good hunting, Herman A. Ogren, biologist with the New Mexico department of game and fish, told scientists.

Several private purchases of Barbary sheep have been made, most of them in New Mexico, he told the American Society of Mammalogists meeting in Washington. In 1955 the animal was declared "big game" by the New Mexico state legislature and the hunt was on. So far only one-half of the hunters who have stalked the sheep have succeeded in bringing home a trophy.

Right now, there is some controversy on the sheep's status, Mr. Ogren said. Cattle raisers and wheat farmers have complained about the destruction caused by America's new big game animal. Hunters believe it will compete with the bighorn sheep—the "royal big game animal."

Those in favor of the Barbary sheep point to the growing numbers of hunters who are seeking game in the West. Also, they say, the Barbary sheep presents a challenge to the hunter. It inhabits extremely rough desert terrain and its color makes it difficult to see. As a trophy, the Barbary's horns rival the bighorn's record of 50 inches. On the practical side there is the fact that some 600 of 650 hunters questioned found that the sheep was good to eat.

By 1960, Mr. Ogren said, the life history of the Barbary sheep should be better known. Scientists should then be able to say if the animal would be found in large enough numbers to threaten cattlemen and wheat farmers.

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PSYCHOLOGY

Antarctic Affects Behavior

MEN ON ICE have special problems.

A U. S. Navy-sponsored study of 700 men isolated in the vast, white, cold Antarctic during Deep Freeze II and III operations found that:

Some men were more concerned about the lack of fresh fruit than the lack of women. Others sat for hours listening to phonograph records. Some became rumor mongers. Some slept most of the time and others could manage only an hour a day for long stretches. Six of the men became so emotionally disturbed they had to be evacuated.

In charge of the study was a Georgetown University psychologist, Dr. John H. Rohrer. He reports his findings, made during his six months on the ice cap, in *Research Reviews*, published by the Naval Research Laboratory. The study's purpose was to help the Navy in selection of personnel for duty in rigorous isolation.

Generally, the factors affecting a man's adjustment to isolation from all outside contact in an extremely harsh environment are the length of his tour of duty and the number of men he has to live with at his station (from as few as 12 men to more than 100).

Dr. Rohrer reports four stages in this adjustment:

1. New arrivals exhibit an increase in anxiety, which for men so predisposed is enough to trigger psychosis or hysteria. The six evacuees developed mental symptoms one to four weeks after getting on the ice.

For most of the men, the anxiety is relieved when they start working. In fact, work becomes the most meaningful social role. The cooks, who provide one of the few gratifications available, assume a higher social level than, for example, the scientists.

2. More depression appears during the winter, probably due to the cold (below minus 100 degrees Fahrenheit at times), the dark, the winds (often more than 100 miles an hour), and the lack of outside work.

This is the stage in which sleeping habits change. The men sometimes hallucinate, cannot concentrate, become irritable and sensitive to the slightest sounds, and suffer headaches (those with more intellectual jobs are more bothered by headaches).

Some men alleviate the boredom by inventing rumors. (One man found copper trimmings near a drill press, melted them and formed them into lumps. He surreptitiously deposited them in the filter of a snow melter and then told the operator that a doctor said a nearby volcano had erupted gold. When the nuggets were found there was a sudden increase in volunteers to assist in snow melting.)

3. With the coming of the sun, airplanes and airdrops, the men knew that isolation was about over. Their depression, boredom and other symptoms lessened. However, there were more headaches.

4. When they were nearly ready to go home, their routines were interrupted and they became less efficient. Once off the ice cap, they readily readjusted.

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PUBLIC HEALTH

Stratosphere Is Source Of Present Fallout

THE FALLOUT now sifting earthward comes entirely from the stratosphere, some seven miles above the earth's surface.

The fission products from nuclear bombs stored in the troposphere, about seven miles, remain there only a month or two. Studies by Drs. Lois Fry and P. K. Kuroda of the University of Arkansas show that the nuclear test explosions in the fall of 1958 caused a very large increase in strontium-89 and barium-140 in the atmosphere.

Their measurements of these radioactive by-products is reported in *Science* (June 26). They report that transfer from the stratosphere to the troposphere accounts for present-day levels of radioactivity.

Science News Letter, July 4, 1959

BIOLOGY

Congressmen Urge Lab For Wildlife Disease

RABIES, ANTHRAX and brucellosis, wildlife diseases that affect man and domestic livestock, may be controlled or even eliminated.

This is the promise of a new national laboratory that congressmen want to establish to study wildlife diseases.

A bill (S. 2086) has been introduced by Senator Gordon Allott (R. Colo.) and several other interested senators to provide for such a laboratory. Now in the report stage in the Senate Committee on Interstate and Foreign Commerce, the bill authorizes some $3,500,000 for the construction and equipping of the wildlife disease laboratory.

In his remarks introducing the bill, Sen. Allott pointed out that while the U.S. has no extensive research program devoted to the study of wildlife diseases, the Soviet Union has a well-equipped and well-staffed laboratory for just such study. Some 28 full-time scientists and 60 "technical and subprofessional employees" in addition to an undetermined number of assistants make up the staff.

The laboratory would be established, equipped and maintained by the U.S. Department of the Interior, Sen. Allott's office told SCIENCE SERVICE and the Colorado State University at Ft. Collins has been suggested as a possible site. The recently opened National Seed Laboratory is also located at the Ft. Collins campus.

Scientists at the wildlife disease laboratory would conduct research into wildlife diseases and problems relating to their causes as they affect man, livestock and wildlife itself. Federal, state and local agencies, in addition to private organizations and universities, would work with the laboratory.

It is not too likely that any action will be taken on the bill this year. However, its passage in the next session of Congress seems possible.

Science News Letter, July 4, 1959

PUBLIC HEALTH

Radiation Dectector May Check Water

RADIOACTIVE FALLOUT in drinking water will have to be "slick" to escape the watchful eye of a new electronic detector.

Continuous monitoring of drinking water supplies was one possible use suggested for the unit by its developers, petroleum researchers at the U. S. Bureau of Mines.

The battery-powered, portable device was developed specifically, however, to check effectiveness of modern techniques of waterflooding. Waterflooding is a method to recover left-over oil in which water is pumped underground to force the left-over oil towards producing wells. The monitor detects and records the movement of the water, "tagged" with radioisotopes, and determines how thoroughly the water is penetrating the oil-bearing reservoir sands.

The 20-pound detector was designed by electronic specialists F. E. Armstrong and E. A. Pavelka of the Bureau of Mines Petroleum Experiment Station at Bartlesville, Okla.

It can be mass-produced for about $500 to $600, compared with a retail price of at least $3,000 for non-portable commercial models, Mines Director Marling J. Ankeny said.

The low price, the useful battery life of over 300 hours, and the portability, should open many industrial and defense uses for the detector, Mr. Ankeny predicted.

Science News Letter, July 4, 1959

ORNITHOLOGY

Booby Is Smart Bird Despite Reputation

DICTIONARY writers may have to upgrade their definition of "booby." There is evidence that it should not mean a "dunce" or "stupid fellow."

Calling a man a booby probably goes back to the booby gannet, a large sea bird that some persons decided looked stupid. Now there is evidence that the bird's looks are deceiving.

For the second time in several years, a booby has been found far from its usual salt water home, but near good fishing grounds. The booby was found near Parker Dam on the California side of the Colorado River, Laurence M. Huey of the Natural History Museum, San Diego, reports.

This shows the rapid adaptability of the booby in entering new territory when conditions are suitable. Formerly the Colorado River was silt-laden and a large fish population could not survive in its waters.

But now, Mr. Huey explains in *The Condor* (May-June), dams built by man have regulated the river flow and many fish live in the clear water, attracting birds.

Science News Letter, July 4, 1959

MATHEMATICS

Station May Broadcast After Loss of Power

A RADIO STATION capable of broadcasting even after losing its electric power source may result from current work.

The research is being done by Dr. Charles P. Wells, professor of mathematics, and Dr. Alfred Leitner, associate professor of physics, both at Michigan State University, under a grant from the U.S. Army.

If an antenna were broadcasting on exactly the right frequency for its size, they theorize, it would continue to broadcast after losing its power source.

This might even make it possible to design a satellite that could broadcast after its batteries fail.

The two scientists are calculating how certain sizes and types of antennas would perform under given conditions. Their problem is one of pure mathematics. Once a solution is found, engineers can go ahead with the design work, they indicated.

Science News Letter, July 4, 1959

IN SCIEN

EDUCATION

Reach Critical Point In Science Faculty Supply

THE ACUTE PROBLEM of the quantity and quality of future college faculties appears to have reached a crisis that may be resolved in either direction.

Although a six-year downward trend in the supply of well-qualified teachers seems to have been checked during 1958-59, there are no apparent resources to draw on for the greatly increased needs expected in the next ten years, according to a report by the Research Division of the National Education Association.

Without expanded budgets, colleges and universities will be forced to choose between too few and too poorly prepared teachers, the report concludes. Citing data on degrees held by newly employed teachers, the report shows that the percentage of those holding doctor's degrees declined to 23.5% in 1956-57, rose to 25.3% in the following year, but fell to 23.8% during 1958-59. Similar trends were seen among those holding a master's degree or less.

Of those earning doctorates in English, foreign languages and history, at least 75% become educators. However, careers in teaching attract much smaller numbers of those receiving doctorate degrees in the critical fields of science and mathematics.

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ASTRONOMY

Television Aids Telescope In Balloon Look at Sun

TELEVISION will join a telescope in a balloon look at the sun from above most of the earth's atmosphere.

For a series of flights to be made this summer, a 12-inch telescope is being equipped with a closed circuit television link so the telescope can be pointed at and focused on the sun from the ground by remote control. The telescope-camera will photograph an area with a width one-tenth the sun's diameter. It will be linked optically to a motion picture camera to obtain a continuous record of images appearing in the telescope reflector. The television photographs taken on the ground will cover about a fifth of the area shown in the telescope.

Dr. Martin Schwarzschild of Princeton University is director of the project to scan the sun from a balloon above the earth's turbulent atmosphere. The upcoming balloon observations are sponsored jointly by the Office of Naval Research and the National Science Foundation.

They also jointly support plans for Stratoscope II, a 36-inch telescope expected to be flown in 1961 to examine objects other than the sun, such as planets, stars and galaxies.

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CE FIELDS

PUBLIC HEALTH

Great Drop Predicted In Infant Death Rate

REDUCTIONS in death rates from 1955 to 1970 in the United States will be much greater, proportionately, for infants and children than for adults and older people, Dr. James D. Tarver of Oklahoma State University has reported.

Using 1930-1954 mortality rates as the basis for his projections, Dr. Tarver predicted that infant mortality rates would decrease nearly 50% during 1955-1970.

He accounted for the relatively high reductions in infant and child mortality by the fact that infants and children have benefited the most from recent progress in medical knowledge and sanitation.

Dr. Tarver said increases in longevity will be larger among nonwhites than with whites and greater among females than with males. In 1970, white females should continue to top the longevity list with a life expectancy of 77.8 years.

An intensification of geriatric problems, due to the greater number of older people, was one of the results he predicted.

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ARCHAEOLOGY

Mayan Stone Monument Bears Date 32 A.D.

A DATED STONE monument has been unearthed by an expedition from the University of Pennsylvania Museum. The monument was erected at a time almost within the lifetime of Christ at Tikal, ceremonial center of the ancient Maya Indians.

It is the oldest known dated monument of the lowland Mayas, the date it bears being equivalent to 32 A.D. by one correlation and 292 A.D. by another.

Tikal, a large and important center of the Mayas, was inhabited possibly as early as 1500 B.C. and dominated the region from about 200 A.D. to 900 A.D. It was in Tikal that scientists discovered an ancient "skyscraper temple," the height of a modern 20-story building.

Tikal, located in northern Guatemala, is now being explored and partially restored by the University Museum in cooperation with the Guatemalan Government.

Since work on the restoration has started, Tikal has become a tourist attraction. Scheduled airplanes make stops there three times a week and a lodge has been erected for overnight guests.

One of the important finds made this year by the expedition is a magnificent stone altar. Carved on the altar is a snake, although the Mayas lacked metal implements for stone carving and must have used hard stone (basalt or flint) rubbed against stone to do the carving.

A tomb was found which must have been the burying place of a very important person, but, unfortunately, nothing was found in it—neither human bones nor tomb furnishings. It had been sacked in Mayan times.

Field director of the expedition was Dr. Edwin M. Shook, on leave to the University Museum from the Carnegie Institution of Washington.

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PUBLIC HEALTH

Polish Health Service Plans Use of Live Virus

ALL CHILDREN in Poland between the ages of six months and seven years who have not yet had a third Salk shot will receive the live virus polio vaccine.

The oral vaccine that will be used is the Wistar Institute strain developed by Dr. Hilary Koprowski, director of the Institute. (See p. 3.)

Adoption of the Wistar polio vaccine strain for large-scale immunization in Poland stems from the investigation of the safety, efficacy and low cost of the vaccine begun last December by the Polish State Institute of Hygiene.

An earlier trial of the vaccine in the Belgian Congo showed that children vaccinated with this strain of the oral vaccine escaped death last winter during a polio epidemic. The epidemic claimed the lives of eight unvaccinated children in and around Leopoldville, the capital of the Belgian Congo.

Leopoldville and the surrounding area experienced 103 cases of paralytic polio from September 1958 through April 1959. Ninety-three of these cases were unvaccinated. Paralytic polio struck 10 children who had received Wistar live virus vaccine.

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MEDICINE

Scientists Find Link Between High I.Q., Gout

PROOF OF SOME truth in the belief that intelligent people are more frequently afflicted with gout has been reported.

There is a low level of positive correlation between the I.Q.'s and the level of uric acid in the blood of 817 G.I.'s.

A high level of uric acid is usually present in the blood of persons suffering from the painful disease that strikes the joints and big toes of its victims.

Many scientists, in studying the case histories of gout patients, have noticed that the relatively rare disease occurred most frequently among prominent and successful people.

It may well be that highly successful people eat richer foods than does the average man, or that a defect in the manner in which the body burns up this food may activate the brain, Drs. DeWitt Stetten Jr., and John Z. Hearon, National Institute of Arthritis and Metabolic Diseases, Bethesda, Md., explain in *Science* (June 26).

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BIOLOGY

Low Dose of Chemical Causes Tumor in Mice

SOMETHING INSIDE the newly born mouse seems to make it more susceptible to cancer-causing agents.

Results of experiments in which 12-hour-old mice were given single, small doses of a purified hydrocarbon should be considered in future cancer studies, a team of researchers report.

Although the young mice came from a strain that was relatively insusceptible to tumors and malignancies, eight out of 25 developed tumors of the lymphoid tissue within a very short time—by 24 weeks of age. Control mice survived and no tumors have appeared so far, Giuseppe Pietpa, Kathryne Spencer and Philippe Shubik of the Chicago Medical School say.

Also, under normal conditions mice of this strain did not develop lymphoid tumors before 42 weeks of age.

The scientists emphasized in their report in *Nature* (June 13), that the development of leukemias and malignant tumors depends largely on "factors inherent in the animals at this stage of development."

It is not enough to study the laboratory transmission of these diseases in mice only in terms of the cancer-causing agent, the researchers suggest. Scientists need to consider the animals' response to the cancer-forming process as a whole.

These findings, the Chicago scientists indicate, are particularly significant in evaluating various virus concepts, in which a virus is believed to be a cause of cancer.

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PALEONTOLOGY

Footprints in California Canyon Point to Camels

RARE footprints of mammals that lived many millions of years ago have been found high on the wall of a small canyon.

The footprints of large and small camels, an antelope and several carnivores or meat-eaters indicate the possibility of a water hole before the sands came. One of the prints shows a well-developed heel and could have been made by a bear-dog, Raymond M. Alf of the Webb School of California, Claremont, reports.

It is very rare, he points out, to find mammal footprints from the geologic time scientists call the Tertiary period. This period, which saw the Age of Mammals, began about 60,000,000 years ago and lasted until about 2,000,000 years ago.

These footprints, found along the Avawatz Mountains near Baker, are the first to be reported from the Mojave Desert. The search for more prints will continue in order to gain more knowledge of the animals, climate and life in the Mojave Desert millions of years ago.

Details of the discovery appear in the *Bulletin of the Southern California Academy of Sciences.*

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penetrating the oil-bearing reservoir sands.

with the design work, they indicated.

the sun, such as planets, stars and galaxies.

GEOPHYSICS

Earth Probe Continues

As part of the International Geophysical Cooperation-1959, scientists around the world are continuing their extensive probing of the earth, its atmosphere and oceans.

By ANN EWING

A WORLD-WIDE cooperation of scientists, started during the International Geophysical Year, is continuing now as part of the International Geophysical Cooperation—1959. It will be maintained for many years to come in at least three important fields: the Antarctic, oceans and space.

The results of such international cooperation cannot be foretold but they are bound eventually to affect every man, woman and child.

One suggested outcome is a large jump in the food fish available to peoples of the East following an intensive study of the Indian Ocean during 1962-1963. This survey will be made by more than 20 ships representing at least that number of countries.

A preliminary exploration of the Indian Ocean will be made during 1960 to determine what should be explored during the full-scale survey. The 1960 study will also be used to train oceanographers from countries bordering the Indian Ocean.

That ocean was selected for a variety of reasons, one being that it is the simplest in which to study the effects of winds on currents. The energy transferred from the wind to the ocean can be measured more easily there than anywhere else on earth, scientists have concluded.

Special Ocean Study

This international operation will be under the direction of SCOR, the Special Committee on Oceanic Research set up by the International Council of Scientific Unions. ICSU is the highest world-wide science body. Its Special Committee for Inter-Union Cooperation in Geophysics, or SCG, is the guiding group for all International Geophysical Cooperation-1959 activities not covered by special organizations like SCOR.

Present and future studies in Antarctica are being handled by SCAR, the Special Committee for Antarctic Research. A 12-nation conference to work out the peaceful and scientific development of the still largely unexplored white continent will be held next October in Washington.

Besides the U. S., the 11 other nations are Russia, Argentina, Australia, Belgium, Chile, France, Japan, New Zealand, Norway, Great Britain and the Union of South Africa. These are the same 12 nations that conducted research in Antarctica during the IGY and are continuing to do so during IGC-1959.

The third special group set up to deal with geophysical research is COSPAR, the international committee on space research. It plans the scientific studies made with rockets, satellites, and space, lunar and planetary probes.

The ten nations of COSPAR include the two that have launched satellites, United States and Russia, and the rocket-launching countries of Canada, Australia, France, Japan and the United Kingdom. Three nations interested in tracking satellites will serve in rotation on COSPAR. Currently these are South Africa, India and Peru.

Also serving on COSPAR are representatives of nine international scientific unions, including astronomy, physics, geophysics, mechanics, chemistry, physiology, biology, radio and biochemistry.

COSPAR has until Dec. 31 to coordinate space research and recommend future steps. It is cooperating with the United Nations on problems of regulation and control of space affecting scientific activities. However, it has no authority to make political decisions.

One action being taken by COSPAR is the establishment of a code of conditions for landing objects on the moon or planets to keep damage at a minimum from the scientific point of view.

The international research programs for the oceans, Antarctica and space are long-range ones. The International Geophysical Cooperation-1959 activities will end on Dec. 31.

This extension of the International Geophysical Year that ended last Dec. 31 is being carried on by most countries cooperating in the IGY at close to the same level of participation. When data gathered during the IGY and IGC-1959 are combined with information learned during preparatory studies, scientists in most disciplines will have three continuing years of reports for their studies.

More Than Space to Study

Although the launching of earth and solar satellites captured man's imagination

WEATHER BALLOON RELEASED—Three Weather Bureau scientists prepare a weather balloon for launching skyward, one of the many thousands of such routine observations being made during the International Geophysical Cooperation—1959.

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against stone to do the carving.

and newspaper headlines, the other programs in geophysics are equally important. They are divided into such fields as meteorology, geomagnetism, aurora and airglow, ionospheric physics, solar activity, cosmic rays, longitudes and latitudes, glaciology, seismology and gravity.

In addition, there are five types of designated world days or series of days on which special observing programs are conducted. These occur when unusual magnetic, ionospheric or auroral activity is predicted, and at times of a solar eclipse or unusual meteor showers.

Remote Research

No matter how remote the site where IGC-1959 scientists are working, from Antarctic outposts to Pacific Islands, an elaborate and far-reaching communications network has been set up so special experiments at planned times can be conducted simultaneously on a planet-wide basis.

These times occur not only on scheduled world days but at times of special alerts. The warnings are broadcast by the World Warning Agency, the National Bureau of Standards' radio forecasting center at Fort Belvoir. They are based mainly on world-wide observations of the sun's surface and on soundings of the ionosphere, the electrically charged portion of the earth's upper atmosphere that reflects radio waves.

Because of IGC-1959, scientists will have a record of solar behavior not only during the highest peak in the sun's activity ever known but into the declining phases of the sunspot cycle.

All information collected during both

(Continued on p. 13)

SNOW DENSITY—Roger Ross determines the density of snow at the IGY Blue Glacier Project, Olympic National Park, Washington. Behind the scale is a part of the coring auger used to bring up samples of snow from beneath the surface.

New Product Information

DINOSAUR and FOSSIL Catalog

Lists a vast variety of genuine fossils—permian oysters, cretaceous snails, pelecypods, pennsylvanian corals, etc. Also fossil kits including specimens from cretaceous through pennsylvanian of dinosaur bones, sea urchins, coral, worm tubes, petrified woods, bryozoa and crinoid stems.

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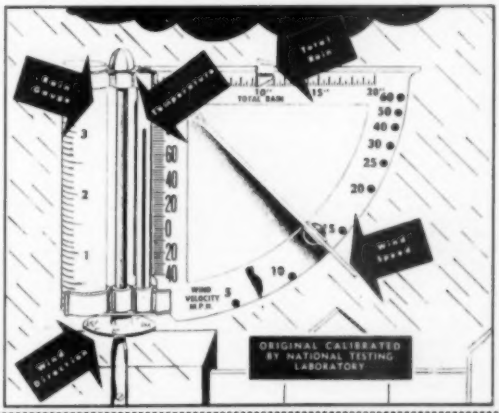

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• Books of the Week •

For the editorial information of our readers, books received for review since last week's issue are listed. For convenient purchase of any U. S. book in print, send a remittance to cover retail price (postage will be paid) to Book Department, Science Service, 1719 N Street, N.W., Washington 6, D. C. Request free publications direct from publisher, not from Science Service.

ADVANCES IN PSYCHIATRY: Recent Developments in Interpersonal Relations—Mabel Blake Cohen, Ed.—*Norton*, 314 p., $4.95. Selected articles which have appeared in the journal *Psychiatry* in the last twenty years.

ANATOMY AND PHYSIOLOGY, Vol. 1: Cells, Tissues, Integument, Skeletal, Muscular and Digestive Systems, Blood, Lymph, Circulatory System—Edwin B. Steen and Ashley Montagu—*Barnes & Noble*, 332 p., illus., paper, $2.50. College Outline textbook.

ATTITUDES OF CERTAIN HIGH SCHOOL SENIORS TOWARD SCIENCE AND SCIENTIFIC CAREERS—Hugh Allen, Jr.—*Teachers College*, 53 p., paper, $1.25. Analysis of responses to questionnaire, seeking to identify some of the factors which resulted in the various attitudes.

AVIATION FACTS AND FIGURES 1959—Rudolf Modley and others, Ben S. Lee, Ed.—*Am. Aviation Publications*, 147 p., illus., paper, $2. Good reference guide on production, research and development, guided missiles, manpower, finance, airlines and transportation, and aviation exports.

BASICS OF MISSILE GUIDANCE AND SPACE TECHNIQUES, Vol. I and II—Marvin Hobbs—*Rider*, 144 and 146 p., illus., 2 vols. in single cloth binding $9, paper, each $3.90. Picture-book course for technical personnel and the general reader.

A BRIEF TEXT IN ASTRONOMY—William T. Skilling and Robert S. Richardson—*Holt*, rev. ed., 353 p., illus., $8.50. Explains in simple terms some of the recent discoveries of radio astronomy, nuclear physics and artificial satellites.

A CLEAR WATER STREAM—Henry Williamson—*Washburn*, 229 p., $3.50. Author tells of his experiences and observations, living beside a trout stream in England.

CODFISH, CATS AND CIVILIZATION—Gary Webster—*Doubleday*, 263 p., $3.95. Informal story of some of the animals, birds, fish and insects, which have helped or hindered man's progress.

COMPENDIUM OF WATER POLLUTION LAWS, Water Pollution Abatement Manual W-5—Carl E. Geuther—*Manufacturing Chemists' Assn*, 53 sheets, paper, $5. State-by-state analysis of working laws and regulations as they pertain to water pollution abatement.

CONTROL ENGINEERING—Gordon J. Murphy—*Van Nostrand*, 385 p., $7.50. Text covering modern automatic control theory at the intermediate level, suitable in a strong, science-oriented engineering curriculum.

DIVE: THE COMPLETE BOOK OF SKIN DIVING—Rick and Barbara Carrier—*Funk, W.*, 294 p., illus., $4.95. Systematic study of the techniques and equipment for skin diving, a sport with opportunities for exploration, for salvage and research in the depth of the sea.

THE EARTH BENEATH THE SEA—Francis P. Shepard—*Johns Hopkins Press*, 275 p., illus., $5. A submarine geologist tells of what is known about the ocean floor, in non-technical language. A wealth of information for the general reader and the scientist in other fields.

FAMILIES IN TREATMENT: From the Viewpoint of the Patient, the Clinician and the Researcher—Erika Chance, foreword by Norman Reider—*Basic Bks*, 234 p., $5.50. Based on a five-year study of families in ongoing treatment. By combining clinical and research descriptions, the study facilitates the understanding of the pathogenic family.

FAMILY PLANNING, STERILITY AND POPULATION GROWTH—Ronald Freedman, Pascal K. Whelpton and Arthur A. Campbell—*McGraw*, 515 p., $9.50. Sociological study of how Americans plan the growth of their families, the success of their plans, and the consequences for the growth of the American population.

GENERAL HOMOGENEOUS COORDINATES IN SPACE OF THREE DIMENSIONS—E. A. Maxwell—*Cambridge Univ. Press*, 169 p., paper, $2.75. Reprint of 1951 edition.

GEOLOGY—Catherine E. Orr and M. Vere DeVault—*Steck*, 47 p., illus. by Ralph White, $1.75. Explains some fundamentals of earth science with simple experiments for the young reader.

HANDBOOK OF DIET THERAPY—Dorothea Turner—*Univ. of Chicago Press*, 3rd ed., 222 p., $5. Includes new chapters on diet during pregnancy, adolescence and old age; energy expenditure; fatty acid modifications; and phenylalanine restrictions.

THE HANDBOOK OF PRIVATE SCHOOLS: An Annual Descriptive Survey of Independent Education—*Sargent*, 40th ed., 1344 p., illus., $10. Includes 3300 U. S. schools, new section on Canadian schools and expanded section on foreign schools.

MATHEMATICAL PUZZLES OF SAM LOYD—Martin Gardner, Ed.—*Dover*, 167 p., illus., paper, $1. Selected puzzles from original *Cyclopedia of Puzzles* (1914), edited for accuracy and clarity.

MAYA: The Riddle and Rediscovery of a Lost Civilization—Charles Gallenkamp—*McKay*, 240 p., photographs by author, illus. by John Skolle, $5.50. An archaeologist's book for the general reader, reconstructing Mayan civilization from archaeological finds in the forests of Yucatan, Guatemala and Honduras.

THE MEANING OF POISON—Lloyd G. Stevenson—*Univ. of Kan. Press*, 53 p., $2. Lecture dealing with two aspects of poison—as cause of disease and as a tool of research in physiology and pharmacology.

MEMO TO A COLLEGE TRUSTEE: A Report on Financial and Structural Problems of the Liberal College—Beardsley Ruml, Part 4: "Achievement of the Possible" by Donald H. Morrison—*McGraw* for The Fund for the Advancement of Education, 94 p., paper, $1. Deals with possible internal improvements of faculties, curricula, facilities and finances of American liberal colleges.

MENTAL HEALTH MANPOWER TRENDS—George W. Albee—*Basic Bks*, 361 p., $6.75. A detailed analysis of mental health needs in the United States and the trained manpower available to meet them. Monograph No. 3 of the Joint Commission on Mental Illness and Health.

THE MODERN SLIDE RULE: A New and Easy Method for its Use—Stefan Rudolf—*William-Frederick Press*, 69 p., illus., paper, $5. Instructional manual with drill problems and answers.

NATIVE TREES of the San Francisco Bay Region—Woodbridge Metcalf—*Univ. of Calif. Press*, 72 p., illus. by Mary B. and Fred Pomeroy and Eugene Murman, paper, $1.50. Pocket guide to help identify 52 native tree species.

PESTICIDE HANDBOOK 1959—Donald E. H. Frear, Ed.—*College Science Pubs.*, 11th ed., 250 p., $3.25 paper, $1.75. Fully revised edition, lists names, active ingredients and manufacturers of more than 7,000 insecticides, fungicides, rodenticides, herbicides and other agricultural chemicals.

PHYSICAL CLIMATOLOGY—Helmut Landsberg—*Gray*, 2nd ed., 446 p., illus., $6. Elementary textbook, fully revised, with guides to further reading.

PHYSIOLOGY—Jessie Helen Haag and M. Vere DeVault—*Steck*, 47 p., illus. by Marjorie Hart, $1.75. Explains for young children some principles of physiology with simple demonstrations the child can do.

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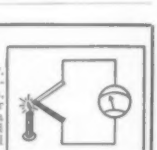

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Fourth Conference on the Biology of Normal and Atypical Pigment Cell Growth—Myron Gordon, Ed.—*Academic*, 647 p., illus., $13.50.

PLAIN TALK FROM A CAMPUS—John A. Perkins—*Univ. of Delaware Press (Univ. Pubs.)*, 195 p., $4. The president of the University of Delaware gives his views on how to cope with ever-increasing enrollments, "shoestring" financing and the confusion over educational aims.

THE PLANT KINGDOM: A Laboratory Manual—Paul C. Lemon and Norman H. Russell—*Mosby*, 176 p., illus., paper, $3.25. Considers the plant kingdom from an evolutional viewpoint, for use with advanced courses.

RADIOACTIVE WASTE DISPOSAL INTO ATLANTIC AND GULF COASTAL WATERS—Working Group of the Committee on Oceanography, NAS-NRC, Dayton E. Carritt, Chmn.—*Nat. Acad. of Sciences-Nat. Res. Council*, 37 p., illus., paper, $1.

RESEARCH TECHNIQUES IN HUMAN ENGINEERING—Alphonse Chapanis—*Johns Hopkins Press*, 316 p., illus., $6. Practical handbook of operational methods of human engineering, of interest to those engaged in industrial engineering, operations research, systems engineering, experimental psychology and scientific management.

ROCKET SCIENCE FOR AMATEURS—L. E. Lewis, Jr.—*Sooner Science Pubs.*, preliminary ed., 50 p., illus., $2. Written by the director of the Oklahoma City Rocket Research Club, to meet the needs of teachers and amateur rocketeers, stressing safety and scientific principles.

SOME TROPICAL SOUTH PACIFIC ISLAND FOODS: Description, History, Use, Composition and Nutritive Value—Mary Murai, Florence Pen and Carey D. Miller—*Univ. of Hawaii Press*, 159 p., illus., paper, $2. Joint project supported by the Pacific Science Board, the U. S. Department of Agriculture and the Foods and Nutrition Department of the Hawaii Agricultural Experiment Station.

STRESS EFFECTS OF ABRASIVE TUMBLING—H. R. Letner—*Mellon Institute*, 19 p., illus., paper, free upon request direct to publisher, 4400 Fifth Ave., Pittsburgh 13, Pa.

TECHNOMETRICS: A Journal of Statistics for the Physical, Chemical and Engineering Sciences, Vol. 1, No. 1—J. Stuart Hunter, Ed.—*Am. Soc. for Quality Control and Am. Statistical Assn.*, 100 p., paper, $2, quarterly, annual subscription $8.

A TREATISE OF THE ANALYTICAL DYNAMICS OF PARTICLES AND RIGID BODIES with an Introduction to the Problem of Three Bodies—E. T. Whittaker—*Cambridge Univ. Press*, 4th ed., 456 p., $4.95. Reprint of 1947 edition.

THE URBAN FRONTIER: The Rise of Western Cities, 1790-1830—Richard C. Wade—*Harvard Univ. Press*, 360 p., $6. Traces the growth of Pittsburgh, Cincinnati, Louisville, Lexington and St. Louis during their first decades.

THE WHITE DESERT—Noel Barber—*Crowell*, 205 p., illus., $4.50. An English newspaperman tells the dramatic story of the scientific expedition which trekked 2220 miles across Antarctica, led by Dr. Vivian Fuchs, thus accomplishing the first successful crossing of this subcontinent.

WHY SHOULD YOU STUDY PHYSICS IN HIGH SCHOOL?—Franklin Miller, Jr.—*Am. Inst. of Physics*, 16 p., illus., paper, single copies free upon request direct to publisher, 335 E. 45th St., New York 17, N. Y. Written to encourage boys and girls in the eighth and ninth grades to plan to study physics.

YOU WILL GO TO THE MOON—Mae and Ira Freeman—*Beginner Bks. (Random House)*, 62 p., illus. by Robert Patterson, $1.95. A book for six-year-olds, conveying concepts of space travel in the simplest terms.

Science News Letter, July 4, 1959

CONSERVATION

Urge Pesticide Study

MILLIONS of dollars to study the effects of the hundreds of millions of dollars worth of pesticides being used throughout the nation, this is what the conservationists have been urging.

Now the Department of the Interior has endorsed legislation to increase the amount of money that its U.S. Fish and Wildlife Service can spend on pesticide research. On the basis of what is already known of the harmful effects of current practices in the use of pesticides on wildlife, Ross L. Leffler, assistant secretary of the Interior, said the money is needed for a greatly increased research program.

Pointing to the large-scale use of insecticides in the U.S. Department of Agriculture's fight to control the imported fire ant and the gypsy moth, conservationists have been demanding more research into the effects of these toxic substances on wildlife. They have cited proof of the harmful effects in the elimination of fish from lakes and streams, reduced fertility in game birds and in fewer songbirds. Spraying with "recommended" doses of insecticide for mosquito and Dutch elm disease control have also taken a toll among wildlife.

Governmental officials responsible for the control programs have said that when used as suggested, the insecticides are not dangerous to wildlife. In evidence they point to the large areas treated, with no reported deaths.

Legislation up before Congress—H.R. 5813 and S. 1575—is aimed at increasing pesticide research funds. The funds authorized for research would be raised from $280,000 to $2,565,000 a year. This does not mean that the Fish and Wildlife researchers will get their money, however. The Appropriations Committee still would have to pass on the amount.

The four major objectives of the proposed pesticide research are: 1. to determine the toxicities of some 200 basic pesticidal chemicals now marketed plus those being developed; 2. to analyze plant and animal tissue to detect pesticide residues, develop diagnostic procedures and to measure toxic conditions in wildlife habitats; 3. to carry out field studies of long-range and immediate effects of pest control on wildlife populations; 4. to make results of this research available to all those interested.

Science News Letter, July 4, 1959

CHEMISTRY

New Chemical Weapons

THE UNITED STATES is totally unprepared to wage modern chemical warfare. Soviet troops in East Germany and Poland are equipped to unleash a crippling chemical attack at a moment's notice.

This unbalance of specialized military power was revealed by Lt. Gen. Arthur G. Trudeau, Army chief of Research and Development, in testimony before the House Science and Astronautics Subcommittee on Research and Development.

Gen. Trudeau said 15% of the Russian arsenal in the two Iron Curtain nations consists of chemical weapons.

He told SCIENCE SERVICE: "The figure is based on U.S. intelligence reports, but I do not know exactly what kinds of weapons they are."

By contrast, he pointed out, the U.S. has no stockpiles of chemicals except for those made during World War II. Our only modern chemical weapons (such as the psychochemicals described to the subcommittee) are in various stages of research and development.

In his testimony, Gen. Trudeau regarded a repugnant attitude of Americans toward chemical warfare as a hindrance to our defense capabilities.

"They are more horrified by the thought of chemical warfare than they are about the ability of a nuclear bomb to burn a million people. Yet, they see the gas chamber as the most humane way of executing criminals. And what is the gas but a lethal chemical!"

He emphasized to the subcommittee that the Army's most urgent problem in chemical and other weapon development is "lead time." This is the amount of time required from concept of a new weapon to research, development, production, and finally to distribution among troops. The lead time in the U.S., he said, is eight to ten years while in Russia it is four to five years.

The frightening difference is mainly due to the bureaucracy inherent in our Governmental and military systems, Gen. Trudeau charged.

Science News Letter, July 4, 1959

Earth Probe Continues

(Continued from p. 10)

IGY and IGC-1959 is being sent to world data centers. In the U. S., the center actually consists of 12 archives located at institutions known for their work.

Also in the U. S., a special committee of scientists trained to use their brains and pencils in attacking problems has been set up to study and analyze the geophysical data collected under the international programs. Because the world itself is the laboratory for geophysicists, these scientists are specialists in various fields from cosmic to seismology.

One unexpected result of the world-wide cooperation has been a surge of interest among young persons in the many problems of geophysics. This has occurred not only in the U. S., but in Russia and virtually every country in the world.

Science News Letter, July 4, 1959

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MEDICINE

Muscular Dystrophy Clue Found in Tissue

NEW CLUES suggest that connective tissue, not muscle fiber, harbors the culprit that causes crippling muscular dystrophy.

Damaging changes occur in muscles when this disease strikes, leaving its victims weak and crippled. Two American researchers have now discovered that the muscle fibers in "a number of cases" have been invaded and are being destroyed by enzymes that are found in connective tissue.

Connective tissue binds together and is the support of the various structures of the body. These enzymes are present in the connective tissue that surrounds the decaying muscle fibers, Geoffrey H. Bourne and M. Nelly Golarz, department of anatomy, Emory University, Atlanta, explain.

It is entirely possible that connective tissue produces an abundance of these enzymes which in turn penetrate muscle fiber to the extent that they destroy the normal supply of nourishment to the muscle, the authors suggest.

Or, there may be a defect in the muscle fibers themselves that causes the formation of these enzymes in connective tissue.

Their third theory suggests that some of the elements in muscle fiber may be "leaking" past without being used by the muscle. The enzymes in connective tissue surrounding these muscles might be preventing the normal replacement of this leakage.

Whichever theory is correct, it now appears that the presence of these enzymes must have some significant role in the cause of muscular dystrophy, the investigators report in *Nature* (June 20).

Science News Letter, July 4, 1959

SOCIOLOGY

Brides and Grooms Are Younger Than Ever

TODAY'S BRIDES and grooms are younger than any others in the nation's history, the Population Reference Bureau reported.

The average age for first marriages in the U. S. last year was 23 for men and 20 for women. More girls married at 18 than at any other age.

In 1890, men averaged 26 at first marriage and women averaged 22. Since then, the average age has been declining slowly but steadily.

Last year about 45% of women marrying for the first time and slightly more than 13% of first-time grooms were less than 20 years of age, the Bureau reported. Idaho's newly married couples were the youngest, with brides averaging 19 and grooms 22. Connecticut's were the oldest, 22 and 24.6 respectively.

The Bureau offered no reason for the trend toward early marriages.

Factors believed to contribute, however, are the nation's continued economic prosperity, teen-agers "going steady" at progressively younger ages, and a significant percentage of pre-marital pregnancies in young girls. The G.I. Bill of Rights financial aid to college students, making it easier for them to marry while still in school, is another possible factor.

The Bureau also reported about one-fourth of last year's marriages in the U. S. were remarriages. One of every 20 divorced women that remarried was a teen-ager. Divorced men remarried, on the average, at 36 and divorced women at 31.

Last year's marriages, the Bureau said, were the fewest since 1939. This was attributed primarily to the 1958 business recession, although the low birth rates in the 1930's and the high birth rates since 1945 were given as secondary reasons.

Science News Letter, July 4, 1959

Questions

ASTRONOMY—Where can the eclipse of Regulus by Venus be seen? p. 2.

MEDICINE—What relationship has been found between high I.Q. and gout? p. 7.

PUBLIC HEALTH—How would a nuclear war between the U.S. and the Soviet Union affect fallout over the world? p. 5.

Photographs: Cover, Joint Committee on Atomic Energy; p. 3, General Electric Company; p. 5, University of California's Radiation Laboratory; p. 10, National Academy of Sciences; p. 11, University of Washington; p. 16, Eastman Chemical Products Inc.

Do You Know

The long-range *timber* goal of the U. S. Forest Service is an annual harvest of 21.1 billion board feet, about three times the 1957 annual cut.

The only rare earth not found in nature is *promethium*, a fission product of uranium-235, named for the Greek god of fire because it is created only in the furnace of nuclear disintegration.

"PACKAGING" MICROWAVES FOR MOUNTAIN TOPS

"TJ" radio-relay station at Black Mesa, Arizona

In Arizona, the telephone company faced a problem. How could it supply more telephone service between Phoenix and Flagstaff—through 135 miles of difficult mountain territory?

Radio offered the economical answer: a new microwave radio-relay system recently created at Bell Telephone Laboratories. Operating at 11,000 megacycles, it was just right for the distance, and the number of conversations that had to be carried.

But first other problems had to be solved: how to house the complex electronic equipment; how to assemble and test it at hard-to-reach relay stations way up in the mountains; and how to do it economically.

On-the-spot telephone company engineers had some ideas. They worked them out with engineers at the American Telephone and Telegraph Company and at Bell Telephone Laboratories. The result: a packaged unit.

The electronic equipment was assembled in trailer-like containers at convenient locations and thoroughly checked out. The complete units were then trucked up the mountains and lifted into position.

The system, now operating, keeps a watch on itself. When equipment falters, a relay station switches in standby equipment, then calls for help over its own beam.

The new Phoenix-Flagstaff link illustrates again how Bell System engineers work together to improve telephone service. Back of their efforts is the constant development of new communications systems at Bell Telephone Laboratories.

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New Machines and Gadgets

For sources of more information on new things described, send a self-addressed stamped envelope to SCIENCE NEWS LETTER, 1719 N St., N.W., Washington 6, D. C., and ask for Gadget Bulletin 994. To receive this Gadget Bulletin without special request each week, remit $1.50 for one year's subscription.

LATEX PAINT can be used inside or outside on concrete floors, walls, patios, steps and porches. It is easy to apply and dries in less than an hour. Warm, soapy water will clean paint from hands and equipment.

Science News Letter, July 4, 1959

NUT REMOVER KIT enables rusted or frozen nuts to be split and removed quickly and without damage to bolt or threads. It consists of a cast steel instrument, with a hole for the nut at one end and a shaft for insertion of a steel cutter. The steel cutter is screwed through the shaft and against the nut until the nut splits. The device is said to cut over 100 nuts without re-sharpening.

Science News Letter, July 4, 1959

SPLICING TAPE for motion picture film is available in a clear plastic dispenser. The tape is said to retain its size, moisture and flexibility, and to hold with all types of film bases.

Science News Letter, July 4, 1959

HAND-SIZE GREASER of lightweight plastic, shown in the photograph, facilitates lubrication of grease fittings on lawn mowers, automobiles, workshop tools and outboard motors. With a press of the thumb on a plunger, the greaser delivers up to 3,000 pounds pressure per square inch through a three-inch nozzle.

Science News Letter, July 4, 1959

WINDOW WASHER has a rotating horsehair brush on the end of an aluminum pole adjustable from 4½ to 15 feet. The washer has a built-in sudser and can be used to wash second-story windows from the ground. It can also be used on automobiles.

Science News Letter, July 4, 1959

SMALL TIME ALARM can be used as a money clip or tie clasp or can be clipped any place you would put a fountain pen. It can be set for any time up to three hours and 55 minutes. It buzzes when the hand reaches the zero hour.

Science News Letter, July 4, 1959

ALUMINUM DOCKS are rustproof, and free from corrosion and rot. Designed for summer water-front homes, the docks come in 45-pound, eight-by-three-foot sections that are easy to install and remove. The decking is coated with skid-proof enamel abrasive tread in various colors.

Science News Letter, July 4, 1959

WALL DECORATING KIT has a plastic stencil pattern, an application brush, a container of blending color in a choice of 12 colors, and instructions. The colors are fast drying, washable and can be applied to any surface that will take ordinary oil paint.

Science News Letter, July 4, 1959

Nature Ramblings

By HORACE LOFTIN

THE FLOCK of shorebirds whirled over the marsh so fast that their wings made a noise audible to the naturalist who watched them so eagerly. At first they circled high, then spotting a clustered group of their companions resting on the shore, they came toward the earth, though hardly lessening their speed.

But as if some invisible hand had snatched them from the sky, three of the flock abruptly stopped in mid-air, struggled briefly, then hung limply five feet from the ground.

The naturalist ran forward, and in a brief moment had them disentangled from the fine, almost invisible webbing of the Japanese mist net which had stopped and held them without causing them the least injury. And he gave a fond look to the wooden decoys beneath the net that had attracted the birds to his net!

In just a few minutes he had taken certain measurements from his captive birds, fastened numbered aluminum bands to their legs, and set them free—three more banded birds who might help in solving the age-old mystery of migration.

Birds in the Hand

Scientific banding dates back to 1899, when a Danish teacher began to put rings on storks, teals, starlings and a few other birds. By 1902, an American scientist was using numbered bands, and in 1909 the American Bird Banding Association was founded to centralize the growing program. The task of keeping up with the growing number of banded bird records became so great that in 1920 the job was taken over by the U.S. Biological Survey (now the Fish and Wildlife Service).

Some seven million birds have already been banded in the program with another 300,000 to 400,000 new banded birds reported each year to headquarters in Laurel, Md. Almost a quarter of a million returns have been recorded from these banded birds, furnishing extremely valuable data on migration, life history, longevity and other phases of bird life not available by any other means.

To the bird watcher who "graduates" to bird bander, the old phrase about birds in hand versus birds in the bush takes on a new meaning. He feels as though the banded bird is "his." There is an incomparable excitement that comes when he hears that "his" bird was recovered in some far away region.

Science News Letter, July 4, 1959